Argument clauses and correlative *es* in German – deriving discourse properties in a unification analysis

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Proceedings of the LFG98 Conference

University of Queensland, Brisbane

Miriam Butt and Tracy Holloway King (Editors)

1998
CSLI Publications
http://www-csli.stanford.edu/publications/

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Abstract

We present an analysis of finite argument clauses in German with the goal of clarifying the conditions that control the presence/absence of an additional correlative *es* in the *Mittelfeld*. The syntactic analysis relies on the assumption that both the clause and the pronominal *es* contribute to the same argument slot of the matrix verb, unifying their f-structure contribution under the same grammatical function. The discourse effects triggered by *es* follow from the behaviour expected from a (semantically) anaphoric element – its presence either indicates that the state of affairs it refers to has already been discussed; or else, it causes presupposition accommodation. The strict exclusion of an *es* along with a topicalized finite clause can be reduced to a violation of generalized binding principles.

1 Introduction

1.1 Basic Data

In German as well as in other languages, various verbs subcategorize for propositional arguments which then bear the function of an object or subject, depending on the respective verb. These arguments can be realized in different ways, as illustrated in (1) for a propositional argument in object role: either by CPs (1a) or by the pronominal *es* which in this usage anaphorically refers to a proposition known from context (1b); some verbs even allow for NPs (denoting propositional entities) as arguments (1c). In this paper, we will concentrate on sentences involving finite argument clauses (henceforth "FAC") and/or pronominal *es*.

(1) a. Hans hat bedauert, daß er gelogen hat.
H. has regretted that he lied has

b. Hans hat es bedauert.
H. has it regretted

c. Hans hat den Vorgang bedauert.
H. has the event regretted

The examples in (1) also illustrate a difference between CPs and pronominals/NPs regarding their unmarked position: CPs occur in a sentence-final position whereas pronominals/NPs typically occur in the *Mittelfeld*.[2]

Beside these three types of realization, there is another possibility which looks like the result of merging the (1a) and (1b) case: the CP and the pronominal *es* can also be realized simultaneously

[2]The term *Mittelfeld* ("middle field") refers to a particular part of a German sentence. Following an old tradition of German grammarians, each German sentence is divided into three parts, the *Vorfeld*, *Mittelfeld*, and *Nachfeld* (some of them possibly empty). These "fields" are separated by the verbal constituents and – in case of subordinate clauses – by the conjunction (cf. Höhle (1986)).

(i)

Vorfeld	verb/conj	*Mittelfeld*	verb	*Nachfeld*
Hans	hat	es	bedauert,	daß er gelogen hat.
H.	*has*	*it*	*regretted*	*that he lied has*
	Weil	Hans es	bedauert hat,	daß er gelogen hat ...
	because	*H. it*	*regretted has*	*that he lied has*

For our purpose it suffices to note that the unmarked position for (pro)nominal arguments is the *Vorfeld* or in the *Mittelfeld* (i.e. in front of verbal constituents or between them) whereas argument CPs are excluded from positions in the *Mittelfeld*.

(2). In this case, the pronominal *es* is usually called a correlative to indicate that the pronominal is in some way related to the sentence-final CP.[3]

(2) Hans hat es bedauert, daß er gelogen hat.
H. has it regretted that he lied has

In the literature it has often been noted that the co-occurrence of *es* and FAC (as in (2)) is subject to stronger contextual restrictions than a FAC on its own (as in (1a)). Kiparsky and Kiparsky (1970) postulate a tight relation between factivity and correlative *it* in English. Furthermore, various authors have observed that the presence of the correlative interacts with information structure and have suggested that *es* serves to mark the FAC as topic or background information. In the following subsections, these proposals will be considered in more detail.

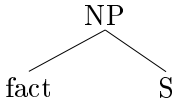
Besides the mentioned discourse-semantic effects (in a wide sense), strict conditions have been observed (i) for the absence of *es* with a FAC in topicalized position, and (ii) for the presence of *es* with a subject clause (Cardinaletti, 1990). The former case will be addressed in sec. 1.3; the latter case we assume to be derived from the discourse-semantic properties in combination with considerations of performance. This point will be briefly addressed in the appendix.

1.2 Previous Accounts

1.2.1 Factivity

In their paper about factivity, Kiparsky and Kiparsky (1970) postulate a tight relation between factivity and correlative *it* in English. In their analysis, presuppositional differences between factive and non-factive verbs are modelled syntactically, i.e., by postulating different deep structures for FACs in combination with factive vs. non-factive verbs, cf. (3).

(3) a. factive clausal arguments:



b. non-factive clausal arguments:

Transformation rules applied to factive clausal arguments yield either (i), a complex NP *the fact that ...*, as in (4a); (ii), a bare CP, after deletion of the head noun *fact* (4b); or (iii), a correlative *it*, followed by a CP (i.e., *it* serves as an optional reduction of the NP *the fact* (4c)).

[3] This correlative *es* also occurs with nonfinite argument clauses (i).
In case of prepositional objects, the correlative has the form *da(r)-* plus preposition (ii.a), (ii.b).

(i) Hans hat (es) bedauert, gelogen zu haben.
H. has (it) regretted lied to have

(ii) a. Hans hat sich über die Lüge geärgert.
H. was REFL about the lie upset

b. Hans hat sich (darüber) geärgert, daß er gelogen hat.
H. was REFL (there-about) upset that he lied has

In this paper, we do not address these cases since both nonfinite and prepositional argument clauses are subject to specific positional restrictions.

(4) a. I regret the fact that John is ill.
b. I regret that John is ill.
c. I regret it that John is ill.

Turning now to non-factive verbs, the Kiparskys argue that their semantics makes them incompatible with nominal objects like *the fact (that ...)* and therefore a correlative *it* is ungrammatical (5).

(5) a. *Bill claims the fact that people are always comparing him to Mozart.
b. *Bill claims it that people are always comparing him to Mozart.

They find further evidence in examples with "indifferent" verbs, i.e., verbs that in principle allow for a factive and a non-factive reading. If combined with *it*, the factive reading is forced, (6).

(6) a. I had expected that there would be a big turnout (but only three people came).
b. I had expected it that there would be a big turnout ([...] – get more chairs).

A similar factivity effect as described by the Kiparskys can also be found in German: (7a) allows for both readings whereas the non-factive reading seems impossible in (7b). This suggests that in German similar mechanisms are at work.

(7) a. Peter hatte erwartet, daß Hans lügen würde.
P. had expected that H. lie would
b. Peter hatte es erwartet, daß Hans lügen würde.
P. had it expected that H. lie would

However, at least in German, the Kiparskys' explanation does not account for all of the data: Firstly, even with non-factive verbs, *es* is possible (8).[4] Secondly, while we agree that without any context, (7b) does not allow for a non-factive reading, this clearly is different provided a suitable context (9). While one can infer from (7b) that Hans did in fact lie (= factive reading), no such inference is possible with respect to (9) – it would result in a contradiction in the given context.

(8) Eigentlich haben (es) alle angenommen, daß Hans lügen würde.
actually has (it) everybody supposed that H. lie would

(9) [context: Hans is cross-examined in court. When he is asked about his private life, none of his friends think he would tell the truth. So everybody is surprised when Hans in fact does tell the truth.]
Auch Peter hatte es erwartet, daß Hans lügen würde.
also P. had it expected that H. lie would

How is this difference between (7b) and (9) to be explained? Obviously the difference is due to context, or more precisely: due to the fact that only in the second case, the content of the FAC is already the topic of the discourse. This observation is at the root of the proposals presented in the following section.

[4] The Kiparskys mention some examples with non-factive verbs allowing for *it* (i). Since here, *it* cannot represent the NP *the fact* for semantic reasons, the Kiparskys consider it as different from correlative *it* but do not have an explanation for it.

(i) This secret, which I would hate it if anyone ever revealed ...

1.2.2 Information Structure

It has been variously hypothesized that the occurrence of *es* marks the FAC as topic or background information. This idea can be traced back to Seidenstücker (1804:46-50), who notes that correlative *es* always refers back to either a concrete statement or a proposition somehow "present" in discourse.[5]

Similar observations have been made among others by Köhler (1976:237, fn. 19); Ullmer-Ehrich (1977:92); Reis (1977:194f, fn. 60); Pütz (1986:37), who all suggest that factors such as "topic", "focus", or "background information" are involved in determining the occurrence of *es*. Reis (1977:195) gives the following example (10).

(10) Du, letzte Neuigkeit: Weißt du (*es) schon, daß Emma ein Kind kriegt?
hey, latest news: know you (it) already that E. a child gets

An intuitive explanation of the unacceptability of *es* in (10) in the spirit of the mentioned authors would be: the speaker wants to reveal some news. If he used a correlative *es* in his statement, he would indicate that the proposition he is just revealing has already been topic of the discourse or part of the shared belief – i.e. the news would be no new information at all.

Thus, the data suggest an account for the use of correlative *es* based on discourse functions. The literature cited above is not concerned with correlative *es* in the first place, so they do not provide for a coherent explanation of the phenomenon. Moreover, neither do they consider another type of construction, which at first sight seems incompatible with the approach sketched so far. The construction in question is dealt with in the following subsection.

1.3 Topicalization

In German, FACs can also occur in sentence initial position. A FAC in this position will typically express the topic of the matrix sentence (in the sense that the sentence is *about* this clause). According to the information structure analysis, a correlative *es* in the *Mittelfeld* should at least be possible if not preferred in this case. But topicalized FACs are strictly incompatible with a correlative *es* in the *Mittelfeld* of the matrix clause. This restriction holds irrespective of the grammatical function (GF) of the topicalized clause ((11a): subject clause – (11b): object clause).[6]

(11) a. Daß Theo kommt, hat (*es) nicht alle gefreut.
*that T. comes has (*it) not all pleased*

b. Daß Theo kommt, hat er (*es) auch nicht geplant.
*that T. comes has he (*it) also not planned*

[5] "Daß sich das *Es*, welches einem Satze eingeschoben wird, jedesmal auf einen früheren, entweder durch wirkliche Aeußerung, oder doch in Gedanken vorhergegangenen Satz bezieht. Wo eine solche Beziehung gar nicht Statt findet, da ist der Gebrauch des *Es* durchaus fehlerhaft." (Seidenstücker (1804:47))

[6] With VP topicalization, an *es* in the *Mittelfeld* seems marginally possible. Haider (1996) mentions the following example (i).

(i) Interessiert, ob er kommt, hätte es mich schon.
interested whether he comes had it me indeed
'I'd indeed have been interested in whether he'd come.'

See also Berman (1998), which emphasizes the syntax of correlative *es* and finite clauses in German and proposes an analysis of the occurrence of *es* and FAC with psych-verbs that captures the data involving VP topicalization and extraction.

Various proposals have been made to explain this fact. Webelhuth (1992) argues that the correlative is illicit because German in general lacks resumptive pronouns. But this lack itself needs an explanation. Other derivational analyses characterize facts like those in (11) as cases of illicit movement:

Müller (1996) considers (11) as a Complex NP Constraint violation. He assumes that the finite clause is base generated as an apposition of a noun phrase headed by the pronominal (12a), parallel to NPs with other nominal heads (12b). (The overt occurrence of the base form (12a) in the *Mittelfeld* is assumed to be excluded for independent reasons.)

(12) a. $[_{NP}$ es $[_{CP}$ daß ...]] (no possible surface structure)
b. $[_{NP}$ die $[_{N'}$ Tatsache $[_{CP}$ daß ...]]] (*the fact that ...*)
c. *$[_{CP}$ $[_{CP}$ daß ...$]_i$ $[_{C'}$ ... $[_{NP}$ $[_{NP}$ [es] $t_i]$ t_i']]]

The complex NP is a barrier for CP in both cases (12a,b). Movement of the CP to the SpecC position of the matrix clause would be possible only via adjunction to the NP. But the resulting S-structure (12c) violates the principle of unambiguous binding (PUB). This principle requires that a trace must be bound unambiguously by antecedents occupying either A'-positions or Spec-positions. The trace t_i in (12c) is bound from an A'-position by the intermediate trace t_i' as well as by the CP in the SpecC position of the matrix clause.[7]

In Berman (1996), which contrasts with our present analysis, sentences with a topicalized FAC are assigned a left-dislocation-structure. The FAC is adjoined to the matrix-CP while a resumptive pronoun (*das* ('that')) has to occupy the SpecC position. A correlative *es* can't cooccur in the *Mittelfeld* since the grammatical function is already realized by the resumptive pronoun. This resumptive pronoun may be phonetically dropped according to the conditions on topic-drop, leaving the FAC as the sole preverbal constituent, (13).

(13) Daß Theo kommt, (das) hat (*es) nicht alle gefreut.
that T. comes (that) has (it) not all pleased

We give an alternative account of the facts in (11). We want to argue that the ungrammaticality is due to a conflict between requirements on pronominal binding and the unification of the f-structures corresponding to the finite clause and the pronominal.

2 LFG Analysis

The correspondence-based architecture of Lexical-Functional Grammar provides the ingredients for a relatively simple account that explains both the various discourse-level effects of the presence vs. absence of correlative *es* in combination with a sentence-final FAC (sec. 1.2) – reducing the effects to a single underlying mechanism – and the strict unacceptability of *es* in combination with a topicalized FAC (sec. 1.3).

[7] Extraposition – i.e., *es* in co-occurrence with sentence-final FAC as in (2) – is possible, because in this case movement targets an A'-position. The intermediate trace is unambiguously bound by antecedents in A'-positions, hence PUB is satisfied.

The key assumption is that the situation where both a FAC and an *es* appear with the same verb, as in (2), can be analyzed syntactically as the simultaneous occurrence of the two simpler constructions in (1a) and (1b). Interaction of the standard constraints on the elements involved – in particular binding theory and semantic anaphoricity – predicts the observed behaviour.

We present the account in two stages: in sec. 2.1, we introduce the doubling-style unification analysis at the level of f-structure and discuss the required assumptions about the PRED values of the elements involved; in sec. 2.2, we address the additional constraints that binding theory and semantic anaphoricity impose on the well-formedness of possible structures generated by the unification account. This will ultimately lead to an explanation of the initial observations.

2.1 Syntactic Analysis

Previous syntactic accounts in the GB framework (Cardinaletti (1990); Vikner (1995), based on Hoekstra (1983); Bennis (1987)) have treated *es* in the *Mittelfeld* in German (or *het* in Dutch, respectively) as an argument (a referential expression which is case- and θ-marked). Accordingly, the sentence-final FAC cannot be an argument itself, but constitutes an adjunct or appositive clause. It is not made explict what exactly it is that ensures that the descriptive content of the appositive clause ultimately restricts the same semantic variable as the *es* bearing the θ-role of the verb. Also, according to this analysis the local syntactic configuration that relates the sentence-final FAC to the matrix clause is radically different depending on whether or not an *es* occurs in the *Mittelfeld*, although the FAC is throughout situated in the same sentence-final position.[8]

The framework of LFG provides the basis for a syntactic account that relies on a uniform analysis of both parts of the construction (the FAC and the *es*), independent of the respective syntactic context. In particular, we assume that at the level of argument structure, there is no principled difference between (1a) and (1b) (repeated below): independent of the categorial realization as a CP or an NP, the thematic role of the propositional argument is identical. That is, contrary to Zaenen and Engdahl (1994), we do not assume, in addition to *theme*, a thematic role *proposition* with the intrinsic feature [-o].[9] Consequently, we assume that on the level of f-structure, German object clauses bear the grammatical function OBJ, like NP objects (rather than COMP).

				NP		**CP**
(1)	a.	Hans	hat		bedauert,	**daß er gelogen hat.**
	b.	Hans	hat	**es**	bedauert.	
(2)		Hans	hat	**es**	bedauert,	**daß er gelogen hat**.
		H.	*has*	*it*	*regretted*	*that he lied has*

The argument structure of *bedauern* will still be the same when both the clause and the *es* occur simultaneously, as in (2). Independently motivated functional annotations introduce the f-

[8] There are situations in which an intonation phrase boundary before a right-dislocated CP would make it plausible to assume a difference in syntactic configuration. However, the canonical use of *es* + FAC doesn't involve this intonatory separation, so we consider an analysis that assumes a single syntactic configuration for canonical FAC (with or without a co-occurring *es*) superior.

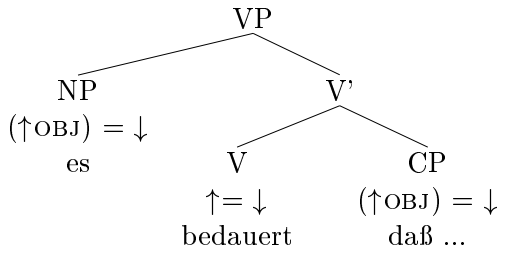
[9] In our analysis, the sentential argument of *bedauern* ('regret'), for instance, is a *theme* [-r].

(i)

	bedauern	<agent,	theme>
		[-o]	[-r]
		[-r]	
		SUBJ	OBJ

structure contribution of both constituents under the appropriate grammatical function (OBJ for our example).[10]

(14)



So, in contrast to the apposition analysis referred to above, the clause in extraposed position will here always be treated as an argument clause, in the sense that its contribution is introduced under the GF OBJ (or SUBJ, for subject clauses). The situation of both *es* and FAC occurring simultaneously is just a special case, in which their contribution will be unified.

We assume that the same mechanism applies as in Andrews' (1990) analysis of clitic doubling in Spanish (15). He argues for unification of the clitic's and the full pronoun's f-structure contribution as the verb's OBJ.

(15) Yo lo ví a él.
I him-clitic saw him

In our case that means that at f-structure both the information contributed by *es* and the information from the FAC end up under the same GF. In order for this to go through, their f-structure contributions must be compatible, in particular their PRED values – a point which will be discussed in the following subsection.

Further empirical evidence in favour of our analysis comes from examples like (16).

(16) *Hans hat es, daß er gelogen hat, gestern bedauert.
H. has it that he lied had yesterday regretted

In German, finite argument clauses are generally excluded in the *Mittelfeld* (other than adverbial clauses and relative clauses). Thus, we predict the ungrammaticality of (16) without further assumptions.

Under an apposition analysis of *es* + FAC, one has to make the extra assumption that the appositive clause involved in this construction – other than relative clauses, for instance – may not occur in the *Mittelfeld* (cf. our discussion of Müller (1996) in sec. 1.3).

[10] An alternative analysis might follow the standard LFG account of extraposition in English of Kaplan and Zaenen (1989/95:158), assuming a PRED-less *es*, bearing a non-thematic function (and thus no GF doubling with the FAC). However, there is a technical and an explanatory problem: (i) Allowing a PRED-less *es* in a free word order language like German (without strict configurational restrictions of occurrence like they can be assumed for the truly expletive "*Vorfeld es*" like in *Es klappert die Mühle.* ('The mill clacks')) will fail to exclude a vacuous iteration of *es* (cf. also the discussion in sec. 2.1.1 below). (ii) The observed discourse-semantic effects of *es* are hard to explain if it is semantically empty; our explanation in sec. 2.2.1 relies on the referential status of *es*.

2.1.1 The status of PRED values

To show why it makes sense to assume compatibility of the f-structure contribution of *es* and the FAC, a more general consideration of the status of PRED values is appropriate.

Since German has relatively free word order, the assignment of a particular grammatical function to a syntactic constituent is not limited to a particular c-structural position; thus an accusative NP, e.g., may occur in various *Mittelfeld* positions or be topicalized and will always bear the grammatical function of the object.[11] Still, a situation where accusative NPs appear simultaneously in more than one of the possible positions, has to be excluded in general.

This is ensured by functional uniqueness: unification of different constituents under the same function is excluded since their PRED values will clash; a vacuous repetition of identical constituents in different c-structure positions is ruled out by a special interpretation of the semantic forms under PRED as *instantiated symbols*, i.e., as implicitly indexed with a new index for each individual occurrence.

Assuming a doubling analysis in the style of Andrews (1990) means claiming that under certain circumstances, the blocking effect of instantiated symbols does not occur, and information about a particular grammatical function can effectively arise from different c-structural positions and be unified. In his analysis of clitic doubling in Spanish, Andrews achieves this by having the clitic introduce its PRED value only optionally.[12]

Kuhn (1998a,b) assumes a similar unification analysis for Split NP constructions like (17), arguing that at the categorial level, both NP parts act like canonical, independent NPs. At the level of grammatical functions, the contribution of the two NPs is unified under the same function, which means, again, that one of the two does not come with an instantiated PRED value in the classical sense.

(17) Kaninchen hat Otto welche gesehen.
rabbits has O. some seen
'As for rabbits, Otto has seen some.'

The apparent *ad hoc* character of having an optional lexical specification of the PRED value for one of the unifying constituents disappears when a more differentiated view is taken on the status of the semantic forms under PRED. As also Dalrymple *et al.* (1995:14) observe, the semantic forms serve multiple purposes in the classical formulation of LFG, which are taken care of by independent mechanisms in more recent versions of the theory. The specification of the semantic relation and the mapping of grammatical functions to semantic roles is taken over by the level of argument structure with Lexical Mapping Theory; subcategorization information (the governed grammatical functions) along with the Completeness and Coherence condition is now regulated by the linear logic-based component of semantic interpretation (cf. e.g., Dalrymple *et al.* (1997)). Even the remaining purpose of PRED values – to mark predicate uniqueness by virtue of instantiation – is redundant under a linear logic-based semantics, as argued in Kuhn (1998b: sec. 4.1). A fully explicit account should therefore be formalized in the linear-logic-based framework.

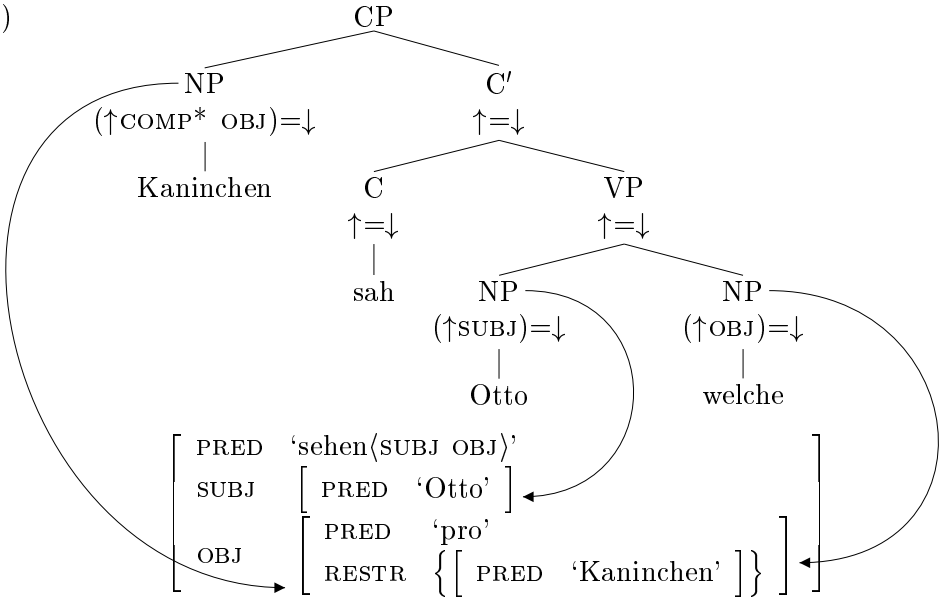
[11] Technically, the f-annotations in the c-structure rules are underspecified as to the exact grammatical function assignment. Case and agreement principles constrain the function specification further (cf. Bresnan (1995:ch. 5), Bresnan (1996:p. 17)).

[12] Note that for the German *es* + FAC construction, it is no sensible option to have *es* introduce its PRED value optionally: this would license vacuous repetition of *es* (cf. fn. 10).

For the sake of readablility, we nevertheless retain (more or less) the classical notation of PRED features with instantiated symbols as their values;[13] however, we make a distinction between (i) the introduction of an instantiated symbol (i.e., a variable or discourse referent): [PRED '...']; and (ii) the specification of a semantic relation restricting such a variable (the separation of the latter is technically achieved by introducing the semantic relation embedded under a set-valued feature RESTR resembling the ADJUNCT feature; this makes the (outer) f-structure compatible with an ordinary PRED value from elsewhere[14]): [RESTR {[PRED '...']}].

In most cases, both parts are contributed by the same category (which explains why classical LFG collapses them), but our notation no longer blocks the situation of a separation, when motivated by the semantic types of the elements involved: in the Split NP construction (17), the topicalized NP part (*Kaninchen*, 'rabbits') does not introduce (or quantify over) a variable/discourse referent of type entity, as required of the object of the predicate *sehen* ('see'), but is rather of type property, serving to restrict the variable introduced and quantified over by the other NP – *welche* 'some' in the *Mittelfeld*.[15] Assuming for simplicity that *welche* introduces just the PRED value 'pro', we thus get the following analysis:

(18)



Essentially, a bare plural indefinite like *Kaninchen* 'rabbits' can either introduce a set of individuals as in (19) or just a property as in (17). This is reached by the alternative lexical specifications of PRED given in (20).[16] Since the *Mittelfeld* part of the Split NP construction (*welche*) introduces its own instantiated PRED value it will combine with the option (20b) of the topic NP.[17]

[13] Kuhn (1998a) introduces a similar simplifying notation and discusses some of its limitations in terms of explanatory power.

[14] Using such a feature to keep track of the contribution to semantics made by the non-instantiated symbol part of a doubling construction within f-structure was suggested by Mary Dalrymple (p.c.).

[15] For the topic NP of type property, cf. Fanselow (1988:105), Van Geenhoven (1996).

[16] We are using the ∋ symbol in order to be able to introduce a set as the value of RESTR and talk about one member of this set in one go; an equivalent notation is implemented in the Xerox Linguistic Environment.

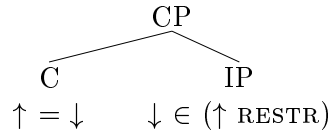
[17] As further evidence for this way of organizing the PRED values, example (i) shows that under the (rare) circumstances of having two topics in a sentence, it is actually possible to have two of the property-type NPs in the Split NP construction, without a clash:

(19) Im Garten hoppeln Kaninchen.
in-the garden hop rabbits
'There are rabbits hopping in the garden.'

(20) a. (↑PRED) = 'inst'
(↑PRED ∋ RESTR) = 'Kaninchen'
b. (↑PRED ∋ RESTR) = 'Kaninchen'

Now, coming back to the FAC construction, our claim is that we have here a similar compatibility in the semantic contribution of two simultaneously occurring constituents: the sentence-final argument clause and the correlative *es*. We assume that the FAC CP is similar to the indefinite above in that it has the potential of just introducing a higher-type restriction on the variable that will actually fill the argument slot of a verb. Alternatively it can provide the variable itself.[18]

Technically, we can achieve this effect by assuming that generally, the content of the IP is introduced under the feature RESTR (cf. (21)). The complementizer (cf. the lexical entry in (22)) comes with two options of PRED specification (corresponding in this aspect to (20)): it either introduces an instantiated symbol, or no semantic contribution at all. In the latter case, the resulting CP will be compatible with a PRED specification from elsewhere.

(21)


(i) Bücher durfte man politische damals in den Osten keine mitbringen.
books was-allowed one political then to the East none bring
'Talking about books – as for political ones, one wasn't allowed to bring any to East Germany.'

[18]The option of a property-type interpretation may be less obvious for CPs than it is for bare plural NPs. For infinitival clauses, it is however fairly straightforward that they may denote event types (as in the preferred reading for (i.a)) rather than introduce a particular event (as preferred for (i.b)):

(i) a. Im Meer zu schwimmen macht Spaß.
in-the sea to swim makes fun
'Swimming in the sea is fun.'
b. Im Meer zu schwimmen hat Spaß gemacht.
in-the sea to swim has fun made
'Swimming in the sea was fun.'

In the former case, the introduction and appropriate quantification of an event variable is not part of the infinitival clause itself, but is taken care of by the matrix verb, its tense etc.

We think that conceivably, a similar two-way distinction is possible for finite CPs (although we are oversimplifying issues of propositional attitudes). The FAC in (ii.a) doesn't seem to introduce (and existentially bind) a proposition variable for Anna's well-being in the same way as the FAC in (ii.b) does:

(ii) a. Ich hoffe, daß es Anna gut geht.
I hope that it A. well goes
'I hope that Anna is well.'
b. Mich beunruhigt, daß es Anna schlecht geht.
me worries that it A. bad goes
'I'm worried about the fact that Anna is not well.'

At least, it seems not totally implausible to assume that it is one option for CPs *not* to introduce a proposition variable themselves, but just a restriction on the interpretation of such a variable (provided from elsewhere).

(22) *daß* C ((↑ PRED) = 'inst')

The *es* will generally introduce a canonical PRED value (like the *Mittelfeld* part of the Split NP construction): PRED = 'pro'. It can thus either stand on its own (cf. (1b)), or it can combine with the property-type variant of a FAC.[19] So, based on the c-structure analysis from (14), we get the following f-structure representation for sentence (2) with the doubling of the object function:

(23)
$$\begin{bmatrix} \text{PRED} & \text{'bedauern}\langle(\uparrow\text{SUBJ})\ (\uparrow\text{OBJ})\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'Hans'} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{RESTR} & \left\{ \begin{bmatrix} \text{PRED} & \text{'lügen}\langle(\uparrow\text{SUBJ})\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \end{bmatrix} \end{bmatrix} \right\} \\ \text{PRED} & \text{'pro'} \\ \text{PERS} & 3 \\ \text{NUM} & \text{sg} \\ \text{CASE} & \text{acc} \end{bmatrix} \end{bmatrix}$$

The f-structure representation for the corresponding sentence without *es* (1a) looks quite similar (24), with the important difference that the PRED value under OBJ has been introduced by the complementizer *daß* (which makes a difference in terms of discourse-semantic effects as will be discussed in sec. 2.2.1), and of course the nominal agreement features are not introduced under OBJ:

(24)
$$\begin{bmatrix} \text{PRED} & \text{'bedauern}\langle(\uparrow\text{SUBJ})\ (\uparrow\text{OBJ})\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'Hans'} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{RESTR} & \left\{ \begin{bmatrix} \text{PRED} & \text{'lügen}\langle(\uparrow\text{SUBJ})\rangle\text{'} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \end{bmatrix} \end{bmatrix} \right\} \\ \text{PRED} & \text{'inst'} \end{bmatrix} \end{bmatrix}$$

Summarizing the aspects of unification and semantic types in our analysis, one may say that at the level of semantics, the FAC in the doubling situation behaves pretty much like an apposition; i.e., it contributes additional restricting information about the independently introduced variable of the referential pronoun *es*. However, the way this appositive information is attached to the argument structure of the matrix verb is not left unclear and doesn't require stipulation of additional principles: Syntactically, in both situations ("appositive" CP with *es*, and CP as a canonical argument without *es*) the same mechanism of function specification applies (cf. the annotated tree in (14)). F-structure unification is possible as long as no clash of semantic types occurs, with the effect that more than one constituent can simultaneously exploit the linking to the same underlying argument slot.

2.2 Binding and anaphoricity

The unification analysis proposed in the previous section will generally license the co-occurrence of a correlative *es* with a FAC, taking into account just the constraints on c-structure and f-structure. However, as discussed in sec. 1.2, there are certain discourse effects associated with

[19] The obligatory introduction of a PRED also blocks the vacuous interation of *es* discussed in fn. 10 and fn. 12.

the presence/absense of *es* that are as yet unexplained. Furthermore, an *es* in the *Mittelfeld* is unacceptable along with a sentence in topicalized position (sec. 1.3).

In the following we will argue that these additional restrictions follow naturally from standard syntactic and semantic properties predicted for the types of elements involved in our analysis – most centrally the status of *es*, which we assume to be an instance of the canonical referential pronoun, rather than a special non-thematic variant.

Sec. 2.2.1 addresses semantic properties of the pronoun *es*, providing a common underlying explanation for the various discourse-related observations; sec. 2.2.2 discusses the pronoun's status within syntactic binding theory, explaining why *es* is unacceptable in combination with a topicalized FAC.

2.2.1 Explaining the discourse properties

The various aspects of behaviour discussed in sec. 1.2 have a common explanation at the level of discourse properties of *es* and the argument clauses, best illustrated within a discourse semantic theory like Discourse Representation Theory (DRT; Kamp and Reyle (1993)): if the correlative *es* behaves like an ordinary pronoun it is predicted that it depends anaphorically on another entity.[20] Appearing in conjunction with a sentence-final FAC, *es* introduces an anaphoric proposition referent. Since the FAC contributes information about the same argument of the matrix verb as the *es*, the FAC expresses strong restrictions on the choice of a suitable antecedent, which must obviously be compatible.[21]

The antecedent binding the referent introduced by the *es* can be either (i), a proposition referent p representing a shared belief of the speaker and the hearer, or (ii), it may be embedded in an attitude attribution contained in the shared belief (e.g., if X is talking to Y, and they both believe that Z believes p). An example which illustrates (i) is (25): one can infer from (25) that both speaker and hearer know about the arrangement mentioned in the FAC. An instantiation of (ii) is the Hans-in-court example (9): some group of people are assigned a certain belief about what Hans would say (namely that he would lie); it is the content of this embedded belief that the *es* in (9) refers to.

(25) Kannst du es Peter sagen, daß wir morgen ins Kino gehen?
can you it P. tell that we tomorrow to-the cinema go

The anaphoric behaviour of *es* lies at the root of the observation that *es* marks the FAC as topic or background information (sec. 1.2.2).
However as an alternative when no antecedent is available, anaphora/presupposition can be also satisfied by accommodation. In the case of *es* this means that in an empty context the proposition referent is introduced to the common belief – which gives rise to the hypothesis that factivity may be involved (sec. 1.2.1); a relevant example is (7b).

We here do not make an attempt to technically incorporate the DRT-style account just sketched into an LFG analysis. That this should in principle be possible is shown by van Genabith and Crouch (1998).

[20] Following the proposal of van der Sandt (1992) that anaphora and presupposition are essentially the same phenomenon, that means that a presuppositional DRS condition is introduced.

[21] Note that we assume that *es* cannot be cataphorically bound by the following FAC, since in the doubling situation, the FAC doesn't introduce its own proposition referent, but only restrictions *on* such a referent – i.e., DRS conditions). So, despite the presence of the restricting information of the FAC, a true *ante*cedent for the referent introduced by *es* needs to be found elsewhere.

In the appendix, we briefly address the empirical situation of subject clauses, which at first sight suggests that more strict, syntactic constraints are involved (Cardinaletti, 1990). We think that an explanation based on performance considerations can be found that is compatible with our discourse-oriented analysis.

2.2.2 Restrictions due to binding theory

In this section we show that the exclusion of *es* after a topicalized FAC is predicted through the principles of binding theory, under the assumption that the entire functional hierarchy, including the discourse function, is taken into account to define the binding domain for pronominals.

In LFG, binding is defined in terms of grammatical functions; conditions on binding apply at the level of f-structure. Roughly, a category α is bound by a category β iff both are coindexed and β bears a GF that is ranked higher than the GF of α in a universal hierarchy. Anaphors (in the syntactic sense, i.e., reflexives and reciprocals) and pronouns differ with respect to binding requirements. The former have to be bound within their binding domain, whereas the latter have to be free. Binding domains are likewise specified in terms of grammatical functions. The binding domain is a set of grammatical functions determined for instance by the subcategorization properties of a predicate.

For anaphoric binding, Dalrymple (1993) has shown that binding domains may vary from one language to another and between different types of anaphors within the same language. It is also a well known fact that binding domains are not necessarily identical for anaphors and pronouns.

In the canonical cases of anaphoric or pronominal binding, the assignment of a non-argument function (a discourse function like TOPIC) to the binder is of no consequence, because binder and bindee are assigned different argument functions as well in any case.

We want to propose that non-argument-functions may enter into binding relations as binders, too. In this spirit the functional hierarchy that is used in the definition of binding and binding domain for pronouns in German has to be extended to include non-argument-functions (in addition to argument-functions).[22] The definition of the functional hierarchy is given in (26). Furthermore, for

[22]There is independent evidence that non-argument-functions (in this case the function ADJUNCT) may enter into binding relations, cf. the contrasts in (i). A locative or temporal NP-Adjunct may be coreferent with a pronoun if the latter is embedded in a finite clause as in (i.a) and (i.b). But coreference is impossible if the pronoun is an argument of the matrix predicate as in (i.c) and (i.d). These facts can be accounted for in a straightforward manner if non-argument-functions are conceived as possible binders and if the binding domain is extended to all GF-values of the f-structure of the predicate: examples (i.c,d) will violate the Anti-binding condition of Bresnan (1995:ch. 9).

(i) a. (?) Theo hat den ganzen Weg$_i$ die Steine gezählt, mit denen er$_i$ gepflastert ist.
T. has the whole road the stones counted with which it paved is
'(Walking) along the road$_i$, Theo counted the stones it$_i$ is paved with.'

b. (?) Theo hat den ganzen Winter$_i$ darauf gehofft, daß er$_i$ endlich zu Ende geht.
T. has the whole winter for-it hoped that it finally to end goes
'All winter$_i$ long Theo hoped it$_i$ (winter) would soon be over.'

c. * Theo hat den ganzen Weg$_i$ über ihn$_i$ geflucht, weil er so holperig ist.
T. has the whole road about it cursed, because it so bumpy is
'(Walking) along the road$_i$, Theo cursed it$_i$ because it is so bumpy.'

d. * Theo hat den ganzen Winter$_i$ über ihn$_i$ geflucht, weil er nicht zu Ende gehen wollte.
T. has the whole winter about it cursed, because it not to end go would
'All winter$_i$ long Theo cursed it$_i$ because it wouldn't end.'

canonical examples of binding (and anti-binding) between NPs, it suffices to define the superiority aspect of binding relative to f-structure elements (cf. definitions (27) from Bresnan (1995:247) and (28), adapted from Dalrymple (1993:125)).

(26) Functional Hierarchy
TOP/FOC > SUBJ > OBJ > OBJ_θ > OBL_θ > ADJ

(27) Syntactic rank
For all f-structure elements A, B: A outranks B if A and B are contained in the same f-structure and A is ranked higher than B in (26) or A outranks C containing B.

(28) Disjointness Condition
A pronominal P may not be coreferent with a coargument A that outranks P.

However, keeping in mind the option of a doubling analysis involving a pronominal, the definition based on f-structure elements is too coarse-grained:

In (29) (repeating (11b)), according to our analysis the topicalized FAC is situated in the SpecC position of the matrix clause. In this position it is assigned the discourse function TOPIC. Both the topicalized clause and the pronominal *es* in the *Mittelfeld* – if present, as in the ungrammatical (29a) – are assigned the grammatical function OBJ, leading to the doubling-type situation discussed in sec. 2.1. In particular, they both project to the same semantic structure, i.e., are co-indexed.

(29) a. *[Daß Theo kommt]$_i$ hat er es$_i$ auch nicht geplant.
that T. comes has he it also not planned
b. Daß Theo kommt, hat er auch nicht geplant.

Intuitively, the Disjointness Condition, originally formulated to relate distinct f-structure elements to each other, carries over in a certain sense to the doubling situation – the pronominal *es*, bearing the function OBJ, may not be coreferent with any other element within its domain that bears some function outranking the pronominal's function. In the unacceptable (29a), the FAC, bearing the highly ranked discourse function of the TOPIC, is coreferential with *es*, thus the sentence is ruled out by binding conditions triggered by the pronominal.

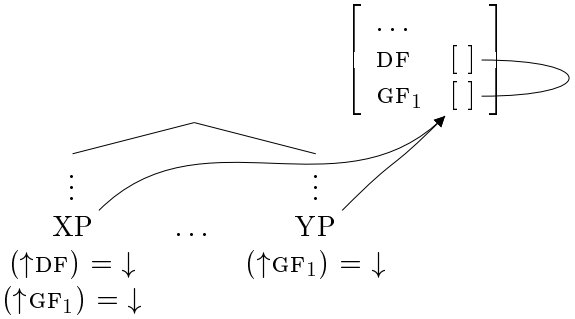
There are however, as already mentioned, two differences in comparison with the more "classical" Disjointness Condition (28): (i), non-argument functions are taken into account as well; (ii), the disjointness condition is "triggered" from the categorial level, rather than from the functional level, since f-structure elements may be the result of unifying distinct c-structure elements, potentially triggering different conditions. (Note that nevertheless the body of the conditions will talk about f-structure and semantic structure; the projection architecture of LFG supports this kind of constraint across levels of representation.)

The – lexically triggered – Revised Disjointness Condition will thus have roughly the following form:

(30) Revised Disjointness Condition
Given a pronominal category P projecting its feature structure under a function F, no distinct category Q that is interpreted as coreferential with P may project its f-structure under a function G that is higher in (26) than F.

The only situations where this principle has a different effect than the more classical formulation (28) are the doubling cases which involve the assignment of a discourse function to the FAC, resulting in a configuration schematically sketched in (31), where according to (30) YP is excluded to be a pronominal.

(31)



However, when the FAC is in the unmarked sentence-final position (as in (2)), typically bearing neither TOPIC nor FOCUS, the co-ocurring *es* in the *Mittelfeld* will go through, since the coreferential FAC is introduced under the same, not a higher function.

Note that a sentence-final FAC (with appropriate prosodic marking) may bear the discourse function FOCUS, e.g., when prompted by a *wh*-question as in (32). Here, we correctly predict the ungrammaticality of a doubling *es*.[23]

(32) [Was hast du erwartet? –] Ich habe (*es) erwartet [$_{\text{FOC}}$ daß Hans lügen würde]
what have you expected? I have (it) expected that H. lie would

If the binding account is true, it is predicted that other doubling constructions involving a pronominal element – as arguably does clitic doubling in Spanish, following Andrews's (1990) analysis – will also exclude discourse functions coinciding with the doubled function. According to the judgements reported by Jaeggli (1981:48), the prediction does meet the data: focus on the direct object is excluded with a doubling clitic:[24]

(33) *Yo lo ví a JUAN.
I him-clitic saw J.

Summarizing this subsection, the binding theory-based reasoning thus explains the strict contrasts observed for the topicalization data in sec. 1.3.[25] The more gradual, context dependent character

[23] Since in German, focus is not marked (purely) structurally, examples like (32) – without the preceding question and thus without this specific focus marking – are certainly well-formed with the *es*.

[24] The situation for indirect objects is more complicated and would require further work under the unification perspective.

[25] Peter Sells (p.c.) pointed out an interesting alternative way to arrive at the same restrictions for the phenomenon under discussion: if *es* was simply lexically marked as incompatible with a discourse function (like in (i)), the observations would follow likewise.

(i) *es* NP (↑PRED) = 'pro'
~(↑DF)

Such a marking is not implausible: it is a well-known empirical generalization that *es* cannot be stressed. Under Sells' proposal, this observation would not be explained as an independent phonological property, but would be claimed to follow as a consequence of the lexical stipulation in (i) (in combination with prosodic principles of DF marking).

of the judgements as to the presence/absence of *es* with a sentence-final FAC (cf. sec. 1.2) follows from the (semantically) anaphoric nature of the pronoun discussed in 2.2.1, in combination with the relative freedom of choice of focus when confronted with more or less isolated data.

3 Conclusion

We presented an analysis of finite argument clauses in German with the goal of clarifying the conditions that control the presence/absence of an additional correlative *es* in the *Mittelfeld*. The syntactic analysis relies on the assumption that both the clause and the pronominal *es* contribute to the same argument slot of the matrix verb, unifying their f-structure contribution under the same grammatical function. The discourse effects triggered by *es* follow from the behaviour expected from a (semantically) anaphoric element – its presence either indicates that the state of affairs it refers to has already been discussed; or else, it causes presupposition accommodation. The strict exclusion of an *es* along with a topicalized finite clause can be reduced to a violation of generalized binding principles.

Appendix: Obligatory *es* with subject clauses?

Contrary to the discourse-related conditions on the use of *es* that we discussed in sec. 1.2 and that we based our analysis on, Cardinaletti (1990) takes the conditions on the occurrence of *es* with subject clauses to be strictly syntactic: According to her, there is an interaction between subjecthood of the FAC and the occurrence of *es*. Cardinaletti (1990:94) assumes that *es* is a verbal argument, not an expletive, i.e., that it occupies a θ-position. Therefore, *es* is always obligatory in constructions with a clause that bears the external θ-role of the verb – hence with a subject clause – as in (34). According to Cardinaletti, if *es* were not present, the subject position SpecI would have to be occupied by an argument null subject *pro*, which doesn't exist in German. (Expletive *pro* in SpecI is also not possible since the verb assigns an external θ-role.)

(34) [cf. Cardinaletti (1990:94, (82))]

weil *(es) deine Vorhersagen beweist, daß er den Hans eingeladen hat
because (it) your predictions proves that he the H. invited has
'... because the fact that he invited Hans proved your predictions correct.'

Vikner (1995:237) criticizes her analysis and provides examples with a CP corresponding to the external argument without *es*, although he admits that the examples are marginal.

(35) [cf. Vikner (1995:237, (37))]

?Ich glaube, daß meine Theorien unterstützt, daß solche Sätze möglich sind.
I believe that my theories supports that such sentences possible are
'I believe the fact that such sentences are possible supports my theories.'

We share Vikner's judgement and assume that this marginality is not due to the violation of a core syntactic constraint.

The discourse effects of *es* in our account (cf. sec. 2.2.1) would actually predict that the use of the correlative is optional: Verbs taking a subject clause typically express a predication about the proposition referred to by that subject clause; e.g., verbs like *beweisen* ('prove'), *zeigen* ('show') express logical consequences (realized as the object) of a given proposition – the subject. This conceptual structuring has the consequence that when a sentence with a verb of this class is uttered, the subject proposition has to be present in the shared belief between the speaker and the audience (which can be enforced through an anaphoric link or via accomodation). So, according to our analysis it is most natural to use an *es*.

But this reasoning still doesn't explain why sentences like (34) are almost unacceptable without an *es*. We conjecture that this effect is due to a performance constraint, avoiding garden paths. The verbs under consideration allow FACs both as their subject and as their object. Now, since subject clauses are comparatively rare, and the unmarked order has the subject precede the object in the *Mittelfeld*, the combination NP – V – CP is parsed with high preference for NP=SUBJ, CP=OBJ. In other words, a situation with a propositional NP object (like *Vorhersagen* 'predictions' and *Theorien* 'theories') and a sentence-final subject clause results in a strong garden path effect (even if case marking and/or verb agreement make the sentence unambiguous). Since furthermore, the possibility of introducing an additional *es* in the *Mittelfeld* as doubling for the subject is available and compatible in terms of discourse semantics, speakers will generally avoid the garden path: The combination NP – *es* – V – CP (like in (36a)) signals unambiguously the functional interpretation NP=SUBJ, *es*/CP=OBJ, because a subject *es* obligatorily precedes object NPs. Against this alternative, the combination *es* – NP – V – CP (like in (36b)) is parsed with a strong bias for *es*/CP=SUBJ, NP=OBJ (even though here, the opposite function specification is possible in an appropriate context).

(36) a. weil deine Theorie es unterstützt, daß ...
because your theory it supports that

b. weil es deine Theorie unterstützt, daß ...
because it your theory supports that

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